JOHN M. SPRATT, JR.
5TH DISTRICT, SOUTH CAROLINA

www.house.gov/spratt

1401 LONGWORTH BUILDING
WASHINGTON, D.C. 20515
(202) 225-5501

COMMITTEES:
CHAIRMAN, BUDGET
ARMED SERVICES

Congress of the United States
House of Representatives
Washington, D.C. 20515

DISTRICT OFFICES:

TOM GETTYS BUILDING
BOX 350
ROCK HILL, SOUTH CAROLINA 29731
(803) 327-1114

707 BULTMAN DRIVE
SUMTER, SOUTH CAROLINA 29150
(803) 773-3362

88 PUBLIC SQUARE
DARLINGTON, SOUTH CAROLINA 29532
(843) 393-3998

August 3, 2009

Mr. Steven Chalk
Principal Deputy Assistant Secretary
Energy Efficiency and Renewable Energy
Mail Stop EE-1
Department of Energy
Washington, DC 20585

RE: Clemson University
DE-FOA-0000112

Dear Mr. Chalk:

I am writing to express my strong support for the application recently submitted by Clemson University for federal funding through the Large Wind Turbine Drivetrain Testing Facility program, made possible by the American Recovery and Reinvestment Act of 2009. Not only will this project have a direct impact on job creation and economic development in South Carolina, but the state is an optimal choice to house such a project.

Specifically, Clemson University seeks to develop a large wind turbine drivetrain test facility located at the Clemson University Restoration Institute (CURI) campus on the former U.S. DOD Naval Base in North Charleston, SC. Clemson's experience and expertise at the Clemson University International Center for Automotive Research (CU-ICAR), where dynamometer test facilities have been designed, built, and operated for the automotive industry, makes it well-equipped to establish this test facility. Moreover, CURI operates materials testing facilities at the Naval Base that will provide analytical support for the test facility. The site will be designed to serve the wind industry's current and future needs in large wind turbine drive train testing. The facility will also serve as platform for research, education, and workforce training.

Clemson University has partnered with an engineering and design firm, redevelopment and ports authorities, local municipalities, private industry, and a national laboratory on this proposal which brings together a qualified team with diverse skills and complementary strengths. Specifically, these partners include: Renk Labeco, Savannah River National Laboratory, Fluor Corp., SCANA, Charleston Naval Complex Redevelopment Authority (RDA), South Carolina State Ports Authority (SCSPA), CMMC LLC., City of North Charleston and City of Charleston. Additionally, the CURI campus represents an ideal site location equipped with existing crane infrastructure to facilitate the movement of large, heavy drive trains from rail or ships.

The test facility will serve as the catalyst to establish a wind energy manufacturing cluster at the former Naval Base to bring economic development to the area. As you know, South Carolina's offshore wind potential has been documented by AWS Truewind and reported by the Department of Energy. Three of the most important cost drivers in developing an offshore wind farm include strong wind resources in shallow waters, access to good port facilities, and a large coastal demand center. According to your agency, South Carolina possesses excellent offshore wind resources close to its growing coastal demand centers in shallow waters near outstanding port facilities like Charleston and Georgetown. As the offshore wind market emerges along the east coast of the United States and land-based turbines continue to grow in size, South Carolina is strategically positioned to serve as an industrial hub from this growing industry.

I hope you will give this project your serious consideration. I wholeheartedly support this grant, and earnestly hope that the Department of Energy will see fit to award it. If you have any questions, please call me or my staffer, Kevin Lawson, at (202)225-5501.

Sincerely,

John M. Spratt, Jr.
Member of Congress

JMSj:esg

BERKELEY COUNTY

SUPERVISOR'S OFFICE
DANIEL W. DAVIS
Supervisor

August 3, 2009

Dr. John Kelly
Clemson University
Vice President, PSA
Executive Director, Clemson University Restoration Institute
360 Truxtun Avenue, Suite 300 B
North Charleston, SC 29405-2045

Dear Dr. Kelly:

Berkeley County is writing this letter in support of Clemson University's application for federal funding through the Large Wind Turbine Drivetrain Testing Facility program, made possible by the American Recovery and Reinvestment Act of 2009 (ARRA). Not only will this project have job creation potential but is in keeping with Berkeley County's "Planning the Future While Preserving the Past". This is a comprehensive plan with guiding principles because Berkeley County has a rich history which the Planning Commission is committed to preserving as well as properly planning for a future that respects the special needs or each individual area of the county.

Specifically, Clemson University seeks to develop a large wind turbine drivetrain test facility located at the Clemson University Restoration Institute (CURI) campus on the former U.S. DOD Naval Base in North Charleston, SC. Clemson's experience and expertise at the Clemson University International Center for Automotive Research (CU-ICAR), where dynamometer test facilities have been designed, built, and operated for the automotive industry, makes it well-equipped to establish this test facility. Moreover, CURI operates materials testing facilities at the Naval Base that will provide analytical support for the test facility. The site will be designed to serve the wind industry's current and future needs in large wind turbine drive train testing. The facility will also serve as platform for research, education, and workforce training.

Clemson University has partnered with engineering and design firm, redevelopment and ports authorities, local municipalities, private industry, and a national laboratory on this proposal, bringing together a qualified team with diverse skills and complementary strengths. Additionally, the CURI campus represents an ideal site location equipped with existing crane infrastructure to facilitate the movement of large, heavy drive trains from rail or ships.

The test facility will serve as the catalyst to establish a wind energy manufacturing cluster at the former Naval Base to bring economic development to the area. Three of the most important cost drivers in developing an offshore wind farm include strong wind resources in shallow waters, access to good port facilities, and a large coastal demand center. According to your agency, South Carolina possesses

County Office Building • P.O. Box 6122 • Moncks Corner, South Carolina 29461-6120 • Telephone (843) 719-4094 • 723-3800 • 567-3136 ext. 4094

excellent offshore wind resources close to its growing coastal demand centers in shallow waters near outstanding port facilities like Charleston and Georgetown. As the offshore wind market emerges along the East Coast of the United States and land-based turbines continue to grow in size, South Carolina is strategically positioned to serve as an industrial hub from this growing industry to meet the 20% Wind by 2030 Scenario.

Sincerely,

Daniel W. Davis
Berkeley County Supervisor

CHARLESTON COUNTY
SOUTH CAROLINA

843.958-4001
Fax: 843.958-4004
aoneal@charlestoncounty.org
Lonnie Hamilton III Public Services Building
4045 Bridge View Drive, Suite B238
North Charleston, SC 29405

Allen O'Neal
County Administrator

August 3, 2009

Dr. John Kelly
Clemson University
Vice President, PSA
Executive Director, Clemson University Restoration Institute
360 Truxtun Avenue, Suite 300 B
North Charleston, SC 29405-2045

Dear Dr. Kelly:

Charleston County is writing this letter in support of Clemson University's application for federal funding through the Large Wind Turbine Drivetrain Testing Facility program, made possible by the American Recovery and Reinvestment Act of 2009 (ARRA). Not only will this project have a direct impact on job creation and economic development in Charleston County, but will also support Charleston County's mission to promote and protect the quality of life in Charleston County.

Specifically, Clemson University seeks to develop a large wind turbine drivetrain test facility located at the Clemson University Restoration Institute (CURI) campus on the former U.S. DOD Naval Base in North Charleston, SC. Clemson's experience and expertise at the Clemson University International Center for Automotive Research (CU-ICAR), where dynamometer test facilities have been designed, built, and operated for the automotive industry, makes it well-equipped to establish this test facility. Moreover, CURI operates materials testing facilities at the Naval Base that will provide analytical support for the test facility. The site will be designed to serve the wind industry's current and future needs in large wind turbine drive train testing. The facility will also serve as platform for research, education, and workforce training.

Clemson University has partnered with an engineering and design firm, redevelopment and ports authorities, local municipalities, private industry, and a national laboratory on this proposal, bringing together a qualified team with diverse skills and complementary strengths. Additionally, the CURI campus represents an ideal site location equipped with existing crane infrastructure to facilitate the movement of large, heavy drive trains from rail or ships.

The test facility will serve as the catalyst to establish a wind energy manufacturing cluster at the former Naval Base to bring economic development to the area. Three of the most important cost drivers in developing an offshore wind farm include strong wind resources in shallow waters, access to good port facilities, and a large coastal demand center. According to your agency, South Carolina possesses excellent offshore wind resources close to its growing coastal demand centers in shallow waters near outstanding port facilities like Charleston and Georgetown. As the offshore wind market emerges along the East Coast of the United States and land-based turbines continue to grow in size, South Carolina is strategically positioned to serve as an industrial hub from this growing industry to meet the 20% Wind by 2030 Scenario.

Sincerely,

Allen O'Neal

Allen O'Neal, County Administrator

Colleton County, South Carolina

August 7, 2009

Dr. John Kelly
Clemson University
Vice President, PSA
Executive Director, Clemson University Restoration Institute
360 Truxtun Avenue, Suite 300 B
North Charleston, South Carolina 29405-2045

Dear Dr. Kelly:

Colleton County is writing this letter in support of Clemson University's application for federal funding through the large Wind Turbine Drivetrain Testing Facility program, made possible by the American Recovery and Reinvestment Act of 2009 (ARRA).

The Colleton County Council works with existing industry to target support services and to attract other national and international investments by facilitating their expansions or initial establishment of operations resulting in direct and/or indirect economic impact in Colleton County. The Council is also making efforts to accomplish the long range goals of expanding technical training skill sets to enhance workforce, and developing programs to expand investments and enrich existing industry related to international trade.

The test facility will serve as the catalyst to establish a wind energy manufacturing cluster at the former naval Base to bring economic development to the South Carolina coastal communities.

Sincerely,

Douglas E. Burns
County Administrator

P.O. Box 157, Walterboro, South Carolina 29488 Tel: (843) 549-1725/5221 Fax: (843) 549-7215

PROGRESSING NATURALLY

COLLETON COUNTY ECONOMIC ALLIANCE, INC.

August 3, 2009

Dr. John Kelly
Clemson University
Vice President, PSA
Executive Director, Clemson University Restoration Institute
360 Truxtun Avenue, Suite 300 B
North Charleston, SC 29405-2045

Dear Dr. Kelly:

Colleton County is writing this letter in support of Clemson University's application for federal funding through the Large Wind Turbine Drivetrain Testing Facility program, made possible by the American Recovery and Reinvestment Act of 2009 (ARRA).

The Colleton County Economic Alliance works with existing industry to target support services and to attract other national and international investments by facilitating their expansions or initial establishment of operations resulting in direct and/or indirect economic impact for in Colleton County. The Alliance is also making efforts to accomplish the long range goals of expanding technical training skill sets to enhance workforce, and developing programs to expand investments and enrich existing industry related to international trade.

The test facility will serve as the catalyst to establish a wind energy manufacturing cluster at the former Naval Base to bring economic development to the South Carolina coastal communities.

Sincerely,

Peter H. Arnoti
Executive Director

St. George (843) 563-0100
St. George Fax: 563-0137
Summerville (843) 832-0100
Summerville Fax: 832-0137
E-mail: wardj@dorchestercounty.net

JASON L. WARD
County Administrator

OFFICE OF THE DORCHESTER COUNTY ADMINISTRATOR
201 JOHNSTON STREET
ST. GEORGE, SOUTH CAROLINA 29477

August 5, 2009

Dr. John Kelly
Clemson University
Vice President, PSA
Executive Director, Clemson University Restoration Institute
360 Truxtun Avenue, Suite 300 B
North Charleston, SC 29405-2045

Dear Dr. Kelly:

Dorchester County is writing this letter in support of Clemson University's application for federal funding through the Large Wind Turbine Drivetrain Testing Facility program, made possible by the American Recovery and Reinvestment Act of 2009 (ARRA). This project development encourages job creation supporting Dorchester County's mission to deliver services that contribute to the well being and quality of life for the collective needs of our citizens.

Specifically, Clemson University seeks to develop a large wind turbine drivetrain test facility located at the Clemson University Restoration Institute (CURI) campus on the former U.S. DOD Naval Base in North Charleston, SC. Clemson's experience and expertise at the Clemson University International Center for Automotive Research (CU-ICAR), where dynamometer test facilities have been designed, built, and operated for the automotive industry, makes it well-equipped to establish this test facility. Moreover, CURI operates materials testing facilities at the Naval Base that will provide analytical support for the test facility. The site will be designed to serve the wind industry's current and future needs in large wind turbine drive train testing. The facility will also serve as a platform for research, education, and workforce training.

Best regards,

Jason L. Ward

Jason L. Ward, Administrator
Dorchester County

Founded 1769

2005

August 3, 2009

Dr. John Kelly
Clemson University
Vice President, PSA
Executive Director, Clemson University Restoration Institute
360 Truxtun Avenue, Suite 300 B
North Charleston, SC 29405-2045

Dear Dr. Kelly:

Georgetown County is writing this letter in support of Clemson University's application for federal funding through the Large Wind Turbine Drivetrain Testing Facility program, made possible by the American Recovery and Reinvestment Act of 2009 (ARRA). This project development encourages job creation and investment in Georgetown County along with growth opportunities for new and existing industries.

Specifically, Clemson University seeks to develop a large wind turbine drivetrain test facility located at the Clemson University Restoration Institute (CURI) campus on the former U.S. DOD Naval Base in North Charleston, SC. Clemson's experience and expertise at the Clemson University International Center for Automotive Research (CU-ICAR), where dynamometer test facilities have been designed, built, and operated for the automotive industry, makes it well-equipped to establish this test facility. Moreover, CURI operates materials testing facilities at the Naval Base that will provide analytical support for the test facility. The site will be designed to serve the wind industry's current and future needs in large wind turbine drive train testing. The facility will also serve as platform for research, education, and workforce training.

Clemson University has partnered with an engineering and design firm, redevelopment and ports authorities, local municipalities, private industry, and a national laboratory on this proposal, bringing together a qualified team with diverse skills and complementary strengths. Additionally, the CURI campus represents an ideal site location equipped with existing crane infrastructure to facilitate the movement of large, heavy drive trains from rail or ships.

The test facility will serve as the catalyst to establish a wind energy manufacturing cluster at the former Naval Base to bring economic development to the area. Three of the most important cost drivers in developing an offshore wind farm include strong wind resources in shallow waters, access to good port facilities, and a large coastal demand center. According to your agency, South Carolina possesses excellent offshore wind resources close to its growing coastal demand centers in shallow waters near outstanding port facilities like Charleston and Georgetown. As the offshore wind market emerges along the East Coast of the United States and land-based turbines continue to grow in size, South Carolina is strategically positioned to serve as an industrial hub from this growing industry to meet the 20% Wind by 2030 Scenario.

Sincerely,

Sel Hemingway
Georgetown County Administrator

GEORGETOWN COUNTY
Post Office Drawer 421270 • 716 Prince Street (29440)
Georgetown, SC 29442-1270
Phone: 843-545-3006
Visit Georgetown County on the Web • http://www.georgetowncountysc.org

Horry County
SOUTH CAROLINA
Committed to Excellence

Horry County Council

August 3, 2009

Dr. John Kelly
Clemson University
Vice President, PSA
Executive Director, Clemson University Restoration Institute
360 Truxtun Avenue, Suite 300 B
North Charleston, SC 29405-2045

Dear Dr. Kelly:

Horry County is writing this letter in support of Clemson University's application for federal funding through the Large Wind Turbine Drivetrain Testing Facility program, made possible by the American Recovery and Reinvestment Act of 2009 (ARRA). Not only will this project have an impact on job creation and economic development in coastal South Carolina, but relates well with Horry County's Envision 2025 Plan. We believe growth will flourish through a passion for sharing our rich heritage and conserving natural resources while promoting economic prosperity.

Specifically, Clemson University seeks to develop a large wind turbine drivetrain test facility located at the Clemson University Restoration Institute (CURI) campus on the former U.S. DOD Naval Base in North Charleston, SC. Clemson's experience and expertise at the Clemson University International Center for Automotive Research (CU-ICAR), where dynamometer test facilities have been designed, built, and operated for the automotive industry, makes it well-equipped to establish this test facility. Moreover, CURI operates materials testing facilities at the Naval Base that will provide analytical support for the test facility. The site will be designed to serve the wind industry's current and future needs in large wind turbine drive train testing. The facility will also serve as platform for research, education, and workforce training.

Clemson University has partnered with an engineering and design firm, redevelopment and ports authorities, local municipalities, private industry, and a national laboratory on this proposal, bringing together a qualified team with diverse skills and complementary strengths. Additionally, the CURI campus represents an ideal site location equipped with existing crane infrastructure to facilitate the movement of large, heavy drive trains from rail or ships.

The test facility will serve as the catalyst to establish a wind energy manufacturing cluster at the former Naval Base to bring economic development to the area. Three of the most important cost drivers in developing an offshore wind farm include strong wind resources in shallow waters, access to good port facilities, and a large coastal demand center. According to your agency, South Carolina possesses excellent offshore wind resources close to its growing coastal demand centers in shallow waters near outstanding port facilities like Charleston and Georgetown. As the offshore wind market emerges along the East Coast of the United States and land-based turbines continue to grow in size, South Carolina is strategically positioned to serve as an industrial hub from this growing industry to meet the 20% Wind by 2030 Scenario.

Sincerely,

Liz Gilland, Chairman

OFFICE OF THE JASPER COUNTY ADMINISTRATOR

358 Third Avenue – Courthouse Square – Post Office Box 1149
Ridgeland, South Carolina 29936 - 843-717-3690 – Fax: 843-726-7800

Andrew P. Fulghum
County Administrator

afulghum@jaspercountysc.gov

August 6, 2009

Dr. John Kelly
Clemson University
Vice President, PSA
Executive Director, Clemson University Restoration Institute
360 Truxtun Avenue, Suite 300 B
North Charleston, SC 29405-2045

Dear Dr. Kelly:

Jasper County is writing this letter in support of Clemson University's application for federal funding through the Large Wind Turbine Drivetrain Testing Facility program, made possible by the American Recovery and Reinvestment Act of 2009 (ARRA). Not only will this project have a direct impact on job creation and economic development for Beaufort and Jasper County but, directly relates to our vision of growing the economy through a green sustainable economy.

Specifically, Clemson University seeks to develop a large wind turbine drivetrain test facility located at the Clemson University Restoration Institute (CURI) campus on the former U.S. DOD Naval Base in North Charleston, SC. Clemson's experience and expertise at the Clemson University International Center for Automotive Research (CU-ICAR), where dynamometer test facilities have been designed, built, and operated for the automotive industry, makes it well-equipped to establish this test facility. Moreover, CURI operates materials testing facilities at the Naval Base that will provide analytical support for the test facility. The site will be designed to serve the wind industry's current and future needs in large wind turbine drive train testing. The facility will also serve as platform for research, education, and workforce training.

Clemson University has partnered with an engineering and design firm, redevelopment and ports authorities, local municipalities, private industry, and a national laboratory on this proposal, bringing together a qualified team with diverse skills and complementary strengths. Additionally, the CURI campus represents an ideal site location equipped with existing crane infrastructure to facilitate the movement of large, heavy drive trains from rail or ships.

The test facility will serve as the catalyst to establish a wind energy manufacturing cluster at the former Naval Base to bring economic development to the area. Three of the most important cost drivers in developing an offshore wind farm include strong wind resources in shallow waters, access to good port facilities, and a large coastal demand center. According to your agency, South Carolina possesses excellent offshore wind resources close to its growing coastal demand centers in shallow waters near outstanding port facilities like Charleston and Georgetown. As the offshore wind market emerges along the East Coast of the United States and land-based turbines continue to grow in size, South Carolina is strategically positioned to serve as an industrial hub from this growing industry to meet the 20% Wind by 2030 Scenario.

Sincerely,

Andrew P. Fulghum, ICMA-CM
County Administrator

Duke Energy

400 South Tryon Street
Charlotte, NC 28285

Mailing Address:
ST17E / P.O. Box 1007
Charlotte, NC 28201-1007

Aug. 5, 2009

Dr. John Kelly
Clemson University Restoration Institute
1360 Truxtun Avenue, Suite 300 B
North Charleston, SC 29405-2045

Subject: Letter of Support for Funding Announcement # DE-FOA-0000112:
Large Wind Turbine Drivetrain Testing Facility

Dear Dr. Kelly:

Duke Energy is writing this letter in support of Clemson University's application for federal funding through the Large Wind Turbine Drivetrain Testing Facility program, made possible by the American Recovery and Reinvestment Act of 2009 (ARRA). Not only will this project have a direct impact on job creation and economic development in the State of South Carolina, but South Carolina is strategically positioned to host such a facility.

Specifically, Clemson University seeks to develop a large wind turbine drivetrain test facility located at the Clemson University Restoration Institute (CURI) campus on the former U.S. DOD Naval Base in North Charleston, SC. Clemson's experience and expertise at the Clemson University International Center for Automotive Research (CU-ICAR), where dynamometer test facilities have been designed, built, and operated for the automotive industry, makes it well-equipped to establish this test facility. Moreover, CURI operates materials testing facilities at the Naval Base that will provide analytical support for the test facility. The site will be designed to serve the wind industry's current and future needs in large wind turbine drive train testing. The facility will also serve as platform for research, education, and workforce training.

Clemson University has partnered with an engineering and design firm, redevelopment and ports authorities, local municipalities, private industry, and a national laboratory on this proposal, bringing together a qualified team with diverse skills and complementary strengths. Additionally, the CURI campus represents an ideal site location equipped with existing crane infrastructure to facilitate the movement of large, heavy drive trains from rail or ships.

The test facility will serve as the catalyst to establish a wind energy manufacturing cluster at the former Naval Base to bring economic development to the area. Three of the most important cost drivers in developing an offshore wind farm include strong wind resources in shallow waters, access to good port facilities, and a large coastal demand center. According to your agency, South Carolina possesses excellent offshore wind resources close to its growing coastal demand centers in shallow waters near outstanding port facilities like Charleston and Georgetown. As the offshore wind market emerges along the East Coast of the United States and land-based turbines continue to grow in size, South Carolina is strategically positioned to serve as an industrial hub from this growing industry to meet the 20% Wind by 2030 Scenario.

Sincerely,

Owen Smith
Managing Director, Regulated Renewable Energy & Carbon Strategy

FLUOR®

Keith Sommer
Senior Manager, Sales

Fluor Enterprises, Inc.
100 Fluor Daniel Drive
Greenville, South Carolina 29607-2770
USA

864.281.4758 tel
864.676.7241 fax
keith.sommer@fluor.com

August 11, 2009

Dr. John Kelly
Clemson University
Vice President, PSA
Executive Director, Clemson University Restoration Institute
360 Truxtun Avenue, Suite 300 B
North Charleston, SC 29405-2045

RE: Wind Turbine Drive Train Test Facility

Dear Dr. Kelly

Fluor is pleased to have had the opportunity to support Clemson University's team in their planning for the new wind turbine drive train test facility to be developed at the former Navy base in Charleston, South Carolina. We have enjoyed a long-standing relationship with Clemson University and look forward to continuing our support of this important project as it progresses.

As a leader in the renewable energy market, Fluor has significant interest in furthering the development of the next generation of wind turbine technologies. We are currently building the world's largest offshore wind farm: a 500-megawatt project located 25 kilometers off the United Kingdom shoreline that will provide carbon-neutral, renewable electricity for more than 415,000 homes. We are also pursuing several offshore wind farm projects in the United States and are aware of the value this drive train test facility will provide to researchers and turbine manufacturers.

Fluor is one of the world's largest engineering, construction, and maintenance firms with a long history of delivering complex, one-of-a-kind projects. In South Carolina, we have completed more than 700 projects across the state since 1990. Our Greenville, South Carolina Center of Excellence, was established in 1942 and is home to more than 2,000 industry professionals, including experts in every discipline of engineering, procurement, construction, and maintenance. We have the expertise and capacity to support Clemson in developing this new test facility.

Please contact me if I can provide any clarifications or additional information on Fluor's capabilities and interest in the project.

Sincerely,

Keith Sommer

1670 Drydock Avenue, Suite 100 • North Charleston, SC 29405
843.554.5009 • 843.554.0403 (Fax)

CMMC, LLC

August 12, 2009

Dr. John Kelly
Clemson University
Vice President, PSA
Executive Director, Clemson University Restoration Institute
1360 Truxtun Avenue, Suite 300 B
North Charleston SC 29405-2045

RE: DE-FOA-0000112, Large Wind Turbine Drivetrain Testing Facility

Dear Dr. Kelly,

CMMC, LLC strongly supports Clemson University's Restoration Institute (CURI) proposal for DE-FOA-0000112 grant application, to build a Large Wind Turbine Drivetrain Testing Facility on their site at the former Charleston Naval Shipyard. The scope of this project directly relates to our mission and the purpose for the founding of CMMC. CURI, like CMMC, understands that building a knowledge based economy with private public partnerships will create high paying industrial jobs for the community.

CMMC, LLC was formed in 1995 for the purpose of privatizing the Charleston Naval Shipyard. The shipyard consists of large industrial buildings, three major dry-docks and numerous industrial piers. The buildings are ideal for heavy manufacturing products requiring large overhead cranes and floor loading capabilities. The CMMC footprint currently has over 25 industrial related companies and employs more than 1,500 workers. Many of the workers are skilled craftsmen, capable of performing all types of skilled industrial manufacturing.

We are very excited about the prospect of a Wind Turbine Testing Facility being proposed in the immediate vicinity of our complex, for we believe that such a Testing Facility is ideally compatible to our type of work activity. The various CMMC companies are considered team members and as such support each others missions. These companies would be a major resource to the Testing Facility by providing an "on-site" pool of skilled labor and equipment.

South Carolina has made significant advancements to develop not only its own wind energy resources, but the development of wind resources around the world through the work at Clemson University. We feel the addition of the Testing Facility to the current industrial businesses located in our Complex would produce major job creation opportunities for the community. We strongly support the establishment of Clemson University's Large Wind Turbine Drivetrain Testing Facility next to our industrial site.

We look forward to the award announcement in October of 2009 that will set the stage for offshore wind development and the economic opportunities to come.

Very truly yours,

Richard K. Gregory
Member

Established 1917

J. E. Oswalt & Sons

Home Office • Batesburg, S.C. • (803) 532-5121
FAX: 803-604-9412
WATS: 1-800-922-5639 FAX: 803-359-1164 Lexington S.C. 803-359-3164
Mailing Address: 1331 Chinquapin Church Rd., Batesburg, S.C. 29006-9250
website: www.oswaltmovers.com email: jeoswaltandsons@aol.com
HEAVY HAULING, RIGGING & HOUSE MOVING

August 6, 2009

John W. Kelly, PhD
Clemson University Restoration Institute
1360 Truxtun Ave., Ste 300B
North Charleston, SC 29405-2045
843-554-7226 ext. 114

Dr. Kelly,

J.E. Oswalt & Sons would like to express an interest in teaming up with the Clemson University Restoration Institute for the Recovery Act: Wind Turbine Drivetrain Testing Facility Funding Opportunity.

J.E. Oswalt & Sons would be available to offload and load the testing materials up to 500 tons from either ocean going vessels at Pier J or by rail car and deliver to the testing facility bay doors.

If you desire more specific details please contact me at any time.

Best regards,

David Oswalt
803-917-2099 Cell

MAYBANK
INDUSTRIES, LLC

August 11, 2009

Dr. John Kelly
Clemson University
Vice President, PSA
Executive Director, Clemson University Restoration Institute
360 Truxtun Avenue, Suite 300 B
North Charleston, SC 29405-2045

Dear John:

We are very pleased to support the Clemson University Restoration Institute and its Consortium for the Wind Turbine Drivetrain Testing Facility. This Facility will (1) create jobs for the New Economy, which we need so desperately in South Carolina; (2) ignite development in an important Brownfield area; (3) reinvigorate our local maritime economy – a collage of local, family businesses and large companies -- which is suffering from a drastic reduction in cargo throughput volume; and (4) perhaps most importantly, bring our state some hope that we might be able overcome our economic obstacles and compete with the rest of the world.

As you know, our company takes great pride in working with the Charleston Maritime Community. From a maritime perspective, our Port is highly strategic because it is the most efficient Port on the East Coast, our proximity to the ocean trade lanes is a competitive advantage, and we will not have a draft limitation as the ocean-going vessels of the future get larger. Since this project will consist of shipping and handling very large pieces of cargo, our maritime competitive advantage is a very important consideration because the inter-modal logistics costs will be a large cost component of wind turbine manufacturing and installation.

Being cost competitive means we can more effectively compete with the rest of the world, who clearly will try to own as much space in this market as possible. We have yet to see but we know that China will ultimately be our largest competitive threat in this market.

Finally, we all suffered through the North Charleston Navy Base closure in the mid-1990's, which was a difficult time for all of us. We believe that the next chapter for that Brownfield Complex should be as a Wind Turbine cluster for our state and country.

We enjoyed participating last week in the Consortium meetings. We are so proud of the group that you all have assembled and that Clemson University is taking this important leadership role. We look forward to working with you in any way possible and wholeheartedly support your grant application.

Thank you very much for this opportunity and we wish you all good luck!

Sincerely,

Jack Maybank
President
Maybank Industries, LLC

525 EAST BAY STREET, SUITE 200 • CHARLESTON, SC 29403 • TEL: (843) 266-0728 • FAX: (843) 266-0729

COASTAL
CONSERVATION
LEAGUE

8.3.09

Dr. John Kelly
Director
Clemson University Restoration Institute
Clemson University
1360 Truxtun Avenue, Suite 300 B
North Charleston, SC 29405-2045

RE: Funding Announcement # DE-FOA-0000112: Large Wind Turbine Drivetrain Testing Facility

Dear Dr. Kelly:

The Coastal Conservation League (CCL) is writing this letter in support of Clemson University's application for federal funding through the Large Wind Turbine Drivetrain Testing Facility program, made possible by the American Recovery and Reinvestment Act of 2009 (ARRA). Not only will this project have a direct impact on job creation and economic development in the State of South Carolina, but South Carolina is strategically positioned to host such a facility.

As a not for profit environmental advocacy organization representing over 4,000 members state wide, the CCL is focused on promoting the development of South Carolina's renewable energy resources. The offshore wind resource along our coast should be a significant factor in this state's future energy portfolio, and we believe that furthering the research and development capabilities of our universities will be a key component of recognizing that potential.

Specifically, Clemson University seeks to develop a large wind turbine drivetrain test facility located at the Clemson University Restoration Institute (CURI) campus on the former U.S. DOD Naval Base in North Charleston, SC. Clemson's experience and expertise at the Clemson University International Center for Automotive Research (CU-ICAR), where dynamometer test facilities have been designed, built, and operated for the automotive industry, makes it well-equipped to establish this test facility. Moreover, CURI operates materials testing facilities at the Naval Base that will provide analytical support for the test facility. The site will be designed to serve the wind industry's current and future needs in large wind turbine drive train testing. The facility will also serve as a platform for research, education, and workforce training.

"Nature and Community in Balance"
P.O. Box 1861 • Beaufort, S.C. 29901-1861 • Telephone (843) 522-1800 • Fax (843) 525-1197
P.O. Box 1765 • Charleston, S.C. 29402-1765 • Telephone (843) 723-8035 • Fax (843) 723-8308
1207 Lincoln Street, Ste. 203-C • Columbia, S.C. 29201 • Telephone (803) 771-7102 • Fax (803) 771-7103
P.O. Box 603 • Georgetown, S.C. 29442-0603 • Telephone (843) 545-0403 • Fax (843) 545-8854
www.coastalconservationleague.org • info@scccl.org

COASTAL
CONSERVATION
LEAGUE

Clemson University has partnered with engineering and design firms, redevelopment and ports authorities, local municipalities, private industry, and a national laboratory on this proposal, bringing together a qualified team with diverse skills and complementary strengths. Additionally, the CURI campus represents an ideal site location equipped with existing crane infrastructure to facilitate the movement of large, heavy drive trains from rail or ships.

The test facility will serve as the catalyst to establish a wind energy manufacturing cluster at the former Naval Base to bring economic development to the area. Three of the most important cost drivers in developing an offshore wind farm include strong wind resources in shallow waters, access to good port facilities, and a large coastal demand center. According to your agency, South Carolina possesses excellent offshore wind resources close to its growing coastal demand centers in shallow waters near outstanding port facilities like Charleston and Georgetown. As the offshore wind market emerges along the East Coast of the United States and land-based turbines continue to grow in size, South Carolina is strategically positioned to serve as an industrial hub from this growing industry to meet the 20% Wind by 2030 Scenario.

Sincerely,

Hamilton Davis
Energy & Climate Program
Coastal Conservation League

SCWF

August 3, 2009

Dr. John Kelly
Director
Clemson University Restoration Institute
Clemson University
1360 Truxtun Avenue, Suite 300 B
North Charleston, SC 29405-2045

RE:Funding Announcement # DE-FOA-0000112: Large Wind Turbine Drivetrain Testing Facility

Dear Dr. Kelly:

The SC Wildlife Federation is pleased to write in support of Clemson University's application for federal funding via the Large Wind Turbine Drivetrain Testing Facility program, made possible by the American Recovery and Reinvestment Act of 2009 (ARRA). This project will have a direct impact on job creation and economic development in South Carolina. As has been indicated by conservationists, industrial development interests and governmental leaders South Carolina is strategically positioned to host such a facility.

Clemson University seeks to develop a large wind turbine drivetrain test facility located at the Clemson University Restoration Institute (CURI) campus on the former U.S. DOD Naval Base in North Charleston, SC. Clemson's experience and expertise at the Clemson University International Center for Automotive Research (CU-ICAR), where dynamometer test facilities have been designed, built, and operated for the automotive industry, makes it well-equipped to establish this test facility. Moreover, CURI operates materials testing facilities at the Naval Base that will provide analytical support for the test facility. The site will be designed to serve the wind industry's current and future needs in large wind turbine drive train testing. The facility will also serve as platform for research, education, and workforce training.

Clemson University has partnered with an engineering and design firm, redevelopment and ports authorities, local municipalities, private industry, and a national laboratory on this proposal, bringing together a qualified team with diverse skills and complementary strengths. Additionally, the CURI campus represents an ideal site location equipped with existing crane infrastructure to facilitate the movement of large, heavy drive trains from rail or ships.

SOUTH CAROLINA WILDLIFE FEDERATION
215 Pickens St. • Columbia, SC 29205 • (803) 256-0670 • (803) 256-0690 FAX • www.scwf.org

This test facility will serve as the catalyst to establish a wind energy manufacturing cluster at the former Naval Base to bring economic development to the area. Three of the most important cost drivers in developing an offshore wind farm include strong wind resources in shallow waters, access to good port facilities, and a large coastal demand center. According to your agency, South Carolina possesses excellent offshore wind resources close to its growing coastal demand centers in shallow waters near outstanding port facilities like Charleston and Georgetown. As the offshore wind market emerges along the East Coast of the United States and land-based turbines continue to grow in size, South Carolina is strategically positioned to serve as an industrial hub from this growing industry to meet the 20% Wind by 2030 Scenario.

Sincerely,

Ben Gregg

Ben Gregg, Executive Director
SC Wildlife Federation

SIERRA CLUB
FOUNDED 1892

August 3, 2009

Dr. John Kelly
Director
Clemson University Restoration Institute
Clemson University
1360 Truxtun Avenue, Suite 300 B
North Charleston, SC 29405-2045

RE: Funding Announcement # DE-FOA-0000112: Large Wind Turbine Drivetrain Testing Facility

Dear Dr. Kelly:

The Sierra Club of SC is writing this letter in support of Clemson University's application for federal funding through the Large Wind Turbine Drivetrain Testing Facility program, made possible by the American Recovery and Reinvestment Act of 2009 (ARRA). Not only will this project have a direct impact on job creation and economic development in the State of South Carolina, but South Carolina is strategically positioned to host such a facility.

Specifically, Clemson University seeks to develop a large wind turbine drivetrain test facility located at the Clemson University Restoration Institute (CURI) campus on the former U.S. DOD Naval Base in North Charleston, SC. Clemson's experience and expertise at the Clemson University International Center for Automotive Research (CU-ICAR), where dynamometer test facilities have been designed, built, and operated for the automotive industry, makes it well-equipped to establish this test facility. Moreover, CURI operates materials testing facilities at the Naval Base that will provide analytical support for the test facility. The site will be designed to serve the wind industry's current and future needs in large wind turbine drive train testing. The facility will also serve as platform for research, education, and workforce training.

Clemson University has partnered with an engineering and design firm, redevelopment and ports authorities, local municipalities, private industry, and a national laboratory on this proposal, bringing together a qualified team with diverse skills and complementary strengths. Additionally, the CURI campus represents an ideal site location equipped with existing crane infrastructure to facilitate the movement of large, heavy drive trains from rail or ships.

South Carolina Chapter · 1314 Lincoln Street, Suite 211· PO Box 2388, Columbia, SC 29202
http://myscsierra.org/chapter/ · Phone 803-256-8487 · Fax 803-256-8448

The test facility will serve as the catalyst to establish a wind energy manufacturing cluster at the former Naval Base to bring economic development to the area. Three of the most important cost drivers in developing an offshore wind farm include strong wind resources in shallow waters, access to good port facilities, and a large coastal demand center. According to your agency, South Carolina possesses excellent offshore wind resources close to its growing coastal demand centers in shallow waters near outstanding port facilities like Charleston and Georgetown. As the offshore wind market emerges along the East Coast of the United States and land-based turbines continue to grow in size, South Carolina is strategically positioned to serve as an industrial hub from this growing industry to meet the 20% Wind by 2030 Scenario.

Sincerely,

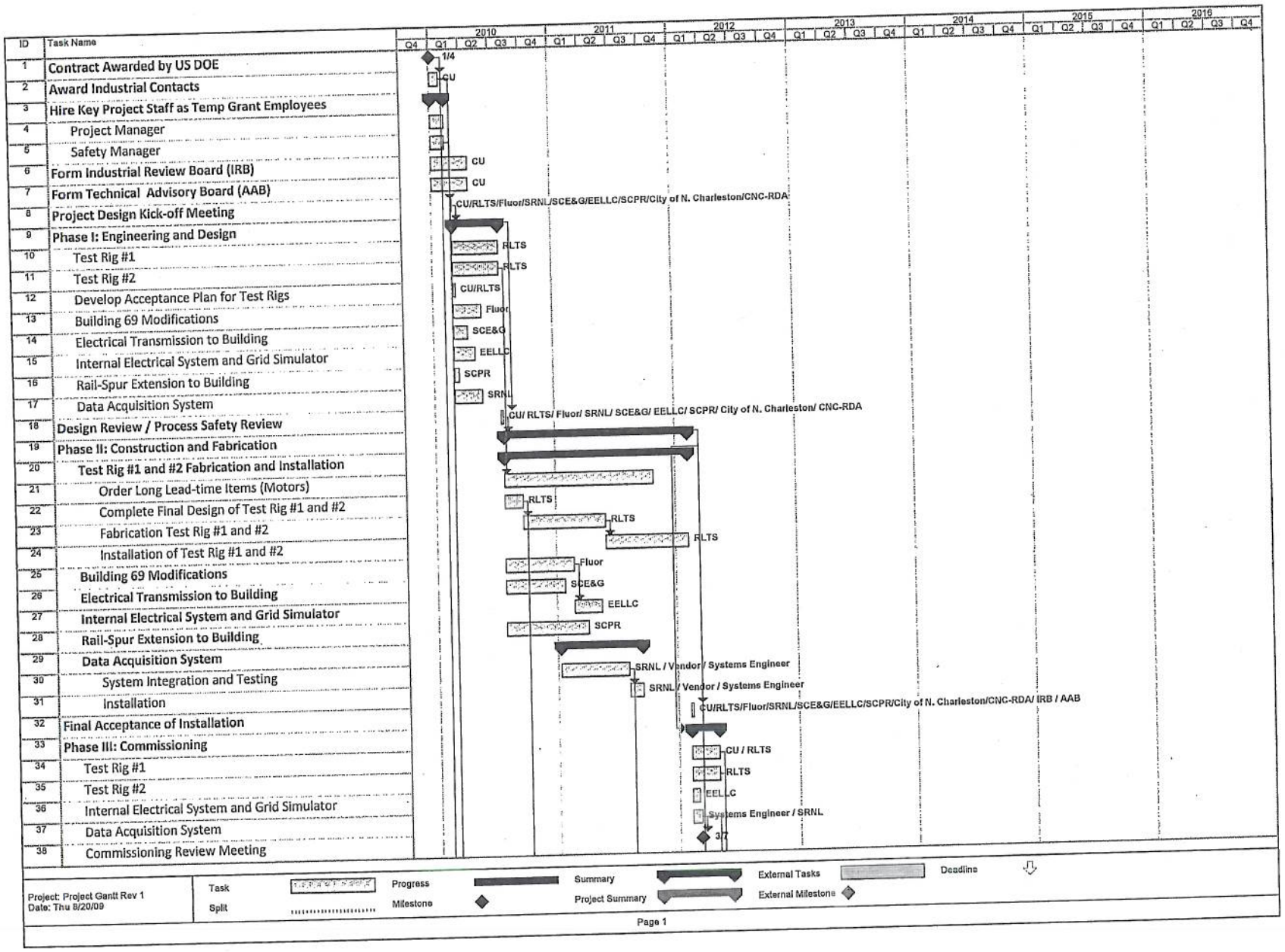
Susan Corbett

Susan Corbett, State Chair
Sierra Club of South Carolina

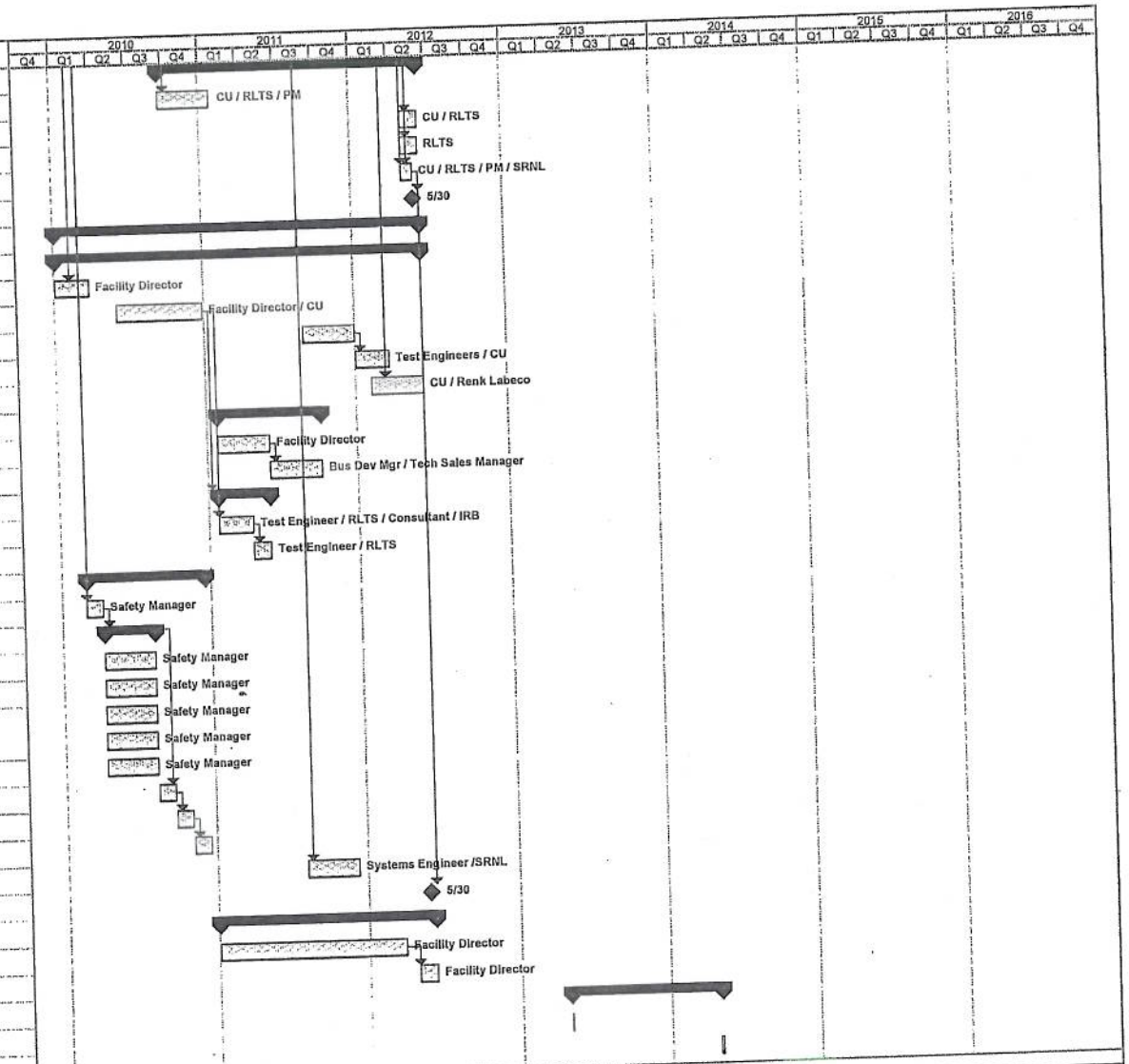
CC: Cary D.Chamblee, Interim Director

APPENDIX A

PROJECT GANTT


ID
Task Name
2010
2011
2012
2013
2014
2015
2016
Q4 Q1 Q2 Q3 Q4
1 Contract Awarded by US DOE
2 Award Industrial Contacts
3 Hire Key Project Staff as Temp Grant Employees
4 Project Manager
5 Safety Manager
6 Form Industrial Review Board (IRB)
7 Form Technical Advisory Board (AAB)
8 Project Design Kick-off Meeting
9 Phase I: Engineering and Design
10 Test Rig #1
11 Test Rig #2
12 Develop Acceptance Plan for Test Rigs
13 Building 69 Modifications
14 Electrical Transmission to Building
15 Internal Electrical System and Grid Simulator
16 Rail-Spur Extension to Building
17 Data Acquisition System
18 Design Review / Process Safety Review
19 Phase II: Construction and Fabrication
20 Test Rig #1 and #2 Fabrication and Installation
21 Order Long Lead-time Items (Motors)
22 Complete Final Design of Test Rig #1 and #2
23 Fabrication Test Rig #1 and #2
24 Installation of Test Rig #1 and #2
25 Building 69 Modifications
26 Electrical Transmission to Building
27 Internal Electrical System and Grid Simulator
28 Rail-Spur Extension to Building
29 Data Acquisition System
30 System Integration and Testing
31 Installation
32 Final Acceptance of Installation
33 Phase III: Commissioning
34 Test Rig #1
35 Test Rig #2
36 Internal Electrical System and Grid Simulator
37 Data Acquisition System
38 Commissioning Review Meeting
1/4
CU
CU
CU
CU/RLTS/Fluor/SRNL/SCE&G/EELLC/SCPR/City of N. Charleston/CNC-RDA
RLTS
RLTS
CU/RLTS
Fluor
SCE&G
EELLC
SCPR
SRNL
CU/ RLTS/ Fluor/ SRNL/ SCE&G/ EELLC/ SCPR/ City of N. Charleston/ CNC-RDA
RLTS
RLTS
RLTS
Fluor
SCE&G
EELLC
SCPR
SRNL / Vendor / Systems Engineer
SRNL / Vendor / Systems Engineer
CU/RLTS/Fluor/SRNL/SCE&G/EELLC/SCPR/City of N. Charleston/CNC-RDA/ IRB / AAB
CU / RLTS
RLTS
EELLC
Systems Engineer / SRNL
3/7
Project: Project Gantt Rev 1
Date: Thu 8/20/09
Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline
Page 1

ID	Task Name
39	**Phase IV: Certification and Accreditation**
40	Test Plan
41	Test Rig #1
42	Test Rig #2
43	Data Acquisition System
44	Accreditation Review Meeting
45	**Phase V: Operations**
46	**Staffing**
47	Develop Job Descriptions
48	Hiring of Key Personnel (Test Engineers)
49	Hiring of Key Personnel (Systems Engineer)
50	Hiring of Operators / Technicians
51	Operator and Technician Training
52	**Marketing Plan**
53	Hiring of Technical Sales Manager
54	Develop marketing plan
55	**Test Facility Procedures**
56	Test Plan Review Procedure
57	Operating Procedures
58	**Safety Procedures**
59	Project Safety Management Plan
60	**Safety Training Program**
61	Hot Work Permit
62	Confined Space Entry Procedure
63	Lock Out - Tag Out Procedure
64	Hot Work Permit
65	Heavy Lift Procedure
66	Safety and Environmental Incident Investigation
67	Emergency First Responder Program
68	Safety Observation Program
69	**Data Acquisition Procedures**
70	**Test Rigs Available to End-users**
71	**3rd 7.5 MW Motor**
72	Order 3rd 7.5 MW Motor
73	Install 3rd 7.5 MW Motor
74	**Annual Facility Review Meeting with IAB and TAB**
75	1st Meeting
76	2nd Meeting



Project: Project Gantt Rev 1
Date: Thu 8/20/09

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

APPENDIX B

BUILDING 69 AND 6.3 ACRE APPRAISAL

A COST APPROACH APPRAISAL OF THE MARKET VALUE OF 6.3 ACRES OF LAND AND IMPROVEMENTS SUPPLY STREET & HOBSON AVENUE, OLD CHARLESTON NAVAL BASE NORTH CHARLESTON, SOUTH CAROLINA

PREPARED FOR
MR. ALAN M. GODFREY, DIRECTOR
REAL ESTATE AND FINANCIAL AFFAIRS
CLEMSON UNIVERSITY RESTORATION INSTITUTE
1360 TRUXTON AVENUE, SUITE 300-B
NORTH CHARLESTON, SOUTH CAROLINA 29405-2005

PREPARED BY
HARTNETT REALTY COMPANY, INCORPORATED
134 MEETING STREET, SUITE 120
CHARLESTON, SOUTH CAROLINA 29401

DATE VALUE ESTIMATE APPLIES
AUGUST 5, 2009

HARTNETT REALTY COMPANY
REALTORS AND APPRAISERS
COMMERCIAL – INDUSTRIAL - RESIDENTIAL
ESTABLISHED 1947
134 MEETING STREET, SUITE 120 – POST OFFICE BOX 221
CHARLESTON, SOUTH CAROLINA 29402

THOMAS F. HARTNETT, JR. CERTFIED APPRAISER

TELEPHONE:
(843)723-7222
FAX:
(843)723-9403

August 11, 2009

Mr. Alan M. Godfrey, Director of Real Estate and Financial Affairs
Clemson University Restoration Institute
1360 Truxtun Avenue, Suite 300B
North Charleston, South Carolina 29405-2005

Re: A Cost Approach Estimate of the Market Value of 6.3 Acres of Land and Improvements Located on Supply Street, Old Charleston Naval Base, North Charleston, South Carolina

Dear Mr. Godfrey:

Pursuant to your request, I have made an appraisal of the above captioned property. The purpose of the appraisal was to render an opinion of the market value of the property. The appraisal is to be used in conjunction with an application for a federal grant.

As a result of my appraisal and analysis, an opinion has been formed that the replacement values of the existing improvements, as per the attached Fagin Inc. estimate, plus estimated value of the subject site as of August 5, 2009, was:

Five Million Two Hundred Forty-One Thousand Dollars
($ 5,241,000)

As per your instructions I have employed only the Cost Approach to Value. It is my understanding that this is satisfactory to your needs at the present time.

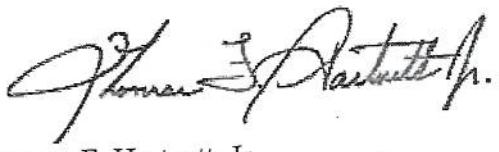
Neither this assignment nor my compensation for making this report was based on a requested minimum valuation, a specific valuation, or the approval of a loan.

The appraisal has also been made in conformity with the Code of Ethics of the Appraisal Section of the National Association of Realtors and the Appraisal Institute.

If you have any questions concerning any of the values reported herein please feel free to get in touch with me at anytime.

Thank you for allowing me to be of service to you and your clients in this matter.

Respectfully submitted,



Thomas F. Hartnett, Jr.
SC Certified General Real Estate Appraiser #CG5005

TFH:jtr

Summary of Important Conclusions

Location:	Supply Street & Hobson Avenue at the former Charleston Naval Base North Charleston, South Carolina
Tms #:	400-00-00-087 (A Portion of)
Owner of Record:	Charleston Naval Complex Redevelopment Authority 1360 Truxton Avenue, Suite 300 North Charleston, South Carolina 29405
Land Area:	6.3+/- Acres
Zoning:	Heavy Industrial (M-2)
Highest and Best Use:	Development and Redevelopment of Subject Site
Opinion of Market Value:	**$ 5,241,000**
Date of Appraisal:	August 5, 2009
Date of Inspection:	August 5, 2009
Flood Zone:	Zone AE Community Panel # 45019C0502J – November 11, 2004
Prepared For:	Mr. Alan M. Godfrey Director of Real Estate and Financial Affairs Clemson University Restoration Institute 1360 Truxton Avenue, Suite 300B North Charleston, South Carolina 29405-2005
Prepared By:	Hartnett Realty Company, Inc. 134 Meeting Street, Suite 120 Charleston, South Carolina 29401 © 2009 By: Hartnett Realty Company, Inc. www.hartnettrealty.com
Census Tract #:	31.08
File Number:	TFH2009-115A-CLEMSON

Property Rights Appraised

The property rights appraised are those of full, complete and unencumbered ownership, subject only to the governmental rights of police power, escheatment, taxation and eminent domain. This is the highest right and title than an individual can hold in real property. It is known as "Fee Simple Interest".

Purpose of the Appraisal

The purpose of the appraisal is to render an opinion of value of the buildings and land.

Intended Use and Users of the Appraisal

The intended use of the appraisal is for it to be used in conjunction with an application for a Federal Grant. The intended users of the appraisal report are the client Alan M. Godfrey, Director of Real Estate and Financial Affairs for Clemson University Restoration Institute, the President and Board of Directors of Clemson University, their accountant and attorneys. There are no other authorized users of the appraisal. The report is not intended to make any representation as to the condition of the property or for determining a selling/buying price. This appraisal report is not applicable, adequate or appropriate for any other use other than that which is stated here. Any other unauthorized users who use or rely upon this appraisal for any purpose does so at their own risk.

Date of the Appraisal

August 5, 2009

Date of the Appraisal Report

August 5, 2009

APPENDIX D

BUILDING 69 DETAILED COST ESTIMATES

ROM ESTIMATE
CURI - WIND TURBINE TEST FACILITY
CHARLESTON, SOUTH CAROLINA
TOTAL PROJECT SUMMARY

Rev 1
Data Date: 17-Aug-09
Print Date: 18-Aug-09

	Site / Site Pipe Racks / Site Electrical	Building 69 Test Facility	Prep Building	Common to All Areas	Total
Building Area (SF)	0	51,840	2,500		54,340
Div 02 - Sitework / Site Improvements / Demolition	$290,000	$419,524	$15,000		$724,524
Div 03 - Concrete		$3,962,691	$319,472		$4,282,164
Div 05 - Structural Steel		$1,335,000	$230,000		$1,565,000
Div 06-10 - Architectural		$990,200	$330,000		$1,320,200
Div 13 - Special Construction - Cold Rms		$0	$0		$0
Div 14 - Vertical Transportation		$0	$0		$0
Div 15 - Plumbing & Drainage		$420,200	$33,000		$453,200
Div 15 - Fire Protection		$259,200	$12,500		$271,700
Div 15 - HVAC & BAS - Dry Side		$798,400	$70,000		$868,400
Div 16 - Electrical	$424,000	$828,480	$62,150		$1,314,630
Div 17 - Instrumentation - Purchase Devices, Install & Bulk Materials		$0	$0		$0
Div 17 - Process Automation - Hardware & Configuration		$0	$0		$0
Div 18 - Process & Utility Equipment Install		$280,000	$0		$280,000
Div 18 - Process & Utility Piping	$240,000	$0	$0		$240,000
Div 19 - Pipe & Equipment Insulation		$0	$0		$0
Div 23 - Process & Utility Equipment Purchase		$2,800,000	$0		$2,800,000
Freight		$84,000	$0		$84,000
Site General Conditions				$355,000	$355,000
Escalation				None Incl	None Incl
Total Direct Construction (TDC)	$954,000	$12,177,696	$1,072,122	$355,000	$14,558,818
Cost per Square Foot		$235	$429		$268
Construction Management @7% TDC					$1,019,117
Total Field Costs (TFC)					$15,577,935
Engineering @ 6% TIC					$994,336
Total Installed Costs (TIC)					$16,572,272
Commissioning					By Equipment Vendor
Total **EPCM w/o Contingency**					$16,572,272
Land Acquisition					Not Required
Test Equipment Vendor Costs					Not Included
Signage					$30,000
Client Supported Equipment					$100,000
Office Equipment					$112,000
Publication/Print Room					$3,000
Modify Existing Fork Trucks					$25,000
Owner's Cost					Not Included
Contingency @10% S/T					$1,684,227
Owner's Contingency / Management Reserve					Not Included
TOTAL PROJECT COSTS w/o Eqpt Vendor or Owner's Cost					$18,526,499
				USE	**$18.5 MM**

ROM ESTIMATE
Project: CURI - Wind Turbine Test Facility
Location: Charleston, South Carolina
Owner: CURI

Greenville, SC Office
Data Date: 17-Aug-09
Print Date: 20-Aug-09
Total SF: 54,340
Estimator: D.Hurt
Rev : 1

CSI DIV	Item Description	Qty	u/m	INSTALLED COST Unit/$	Total
	DIRECT COST SUMMARY				
	SITE / SITE PIPE RACKS / SITE ELECTRICAL				$954,000
	DIV 02 - SITEWORK / SITE IMPROVEMENTS / SITE STRUCTURES	1	LS	290,000.00	$290,000
	DIV 16 - ELECTRICAL	1	LS	424,000.00	$424,000
	DIV 18 - PIPING/MECHANICAL SERVICES	1	LS	240,000.00	$240,000
	BUILDING 69 TEST FACILITY				
	BUILDING SHELL	51,840	SF	118.31	$6,133,216
	DIV 02 - DEMOLITION	51,840	SF	8.09	$419,524
	DIV 03 - CONCRETE	51,840	SF	76.44	$3,962,691
	DIV 05 - STRUCTURAL STEEL	51,840	SF	25.75	$1,335,000
	DIV 6-10 - ARCHITECTURAL	51,840	SF	8.02	$416,000
	DIV 14 - VERTICAL TRANSPORTATION	51,840	SF	0.00	$0
	DIV 16 - ELECTRICAL	51,840	SF	0.00	$0
	INTERIOR BUILD-OUT	51,840	SF	50.16	$2,600,480
	DIV 6-10 - ARCHITECTURAL	51,840	SF	11.08	$574,200
	DIV 13 - SPECIAL CONSTRUCTION - COLD ROOMS	51,840	SF	0.00	$0
	DIV 15 - PLUMBING & DRAINAGE	51,840	SF	8.11	$420,200
	DIV 15 - HVAC & BAS - DRY AIR SIDE	51,840	SF	15.40	$798,400
	DIV 15 - FIRE PROTECTION	51,840	SF	5.00	$259,200
	DIV 16 - ELECTRICAL	51,840	SF	10.58	$548,480
	PROCESS/UTILITY EQUIPMENT ITEMS	4	PCS	700,000.00	$2,800,000
	AUTOMATION SYSTEM	0	IO	#DIV/0!	$0
	EQUIPMENT INSTALLATION COSTS	20%	EQ$	2800000	$560,000
	DIV 05 - STRUCTURAL STEEL	0%	EQ$	2800000	$0
	DIV 18 - EQUIPMENT INSTALLATION	10%	EQ$	2800000	$280,000
	DIV 18 - PIPING - PROCESS & UTILITY	0%	EQ$	2800000	$0
	DIV 17 - INSTRUMENTATION - DEVICES, INSTALLATION & BULK MATERIALS	0%	EQ$	2800000	$0
	DIV 16 - PROCESS ELECTRICAL	10%	EQ$	2800000	$280,000
	DIV 19 - PIPE & EQUIPMENT INSULATION	0%	EQ$	2800000	$0
	FREIGHT	3.0%	EQ$	2,800,000	$84,000
	S/T - BUILDING 69 TEST FACILITY				$12,177,696
	PREP BUILDING				
	BUILDING SHELL	2,500	SF	331.79	$829,472
	DIV 02 - DEMOLITION	2,500	SF	6.00	$15,000
	DIV 03 - CONCRETE	2,500	SF	127.79	$319,472
	DIV 05 - STRUCTURAL STEEL	2,500	SF	92.00	$230,000
	DIV 6-10 - ARCHITECTURAL	2,500	SF	104.00	$260,000
	DIV 14 - VERTICAL TRANSPORTATION	2,500	SF	0.00	$0
	DIV 16 - ELECTRICAL	2,500	SF	2.00	$5,000
	INTERIOR BUILD-OUT	2,500	SF	97.06	$242,650
	DIV 6-10 - ARCHITECTURAL	2,500	SF	28.00	$70,000
	DIV 13 - SPECIAL CONSTRUCTION - COLD ROOMS	2,500	SF	0.00	$0
	DIV 15 - PLUMBING & DRAINAGE	2,500	SF	13.20	$33,000
	DIV 15 - HVAC & BAS - DRY AIR SIDE	2,500	SF	28.00	$70,000
	DIV 15 - FIRE PROTECTION	2,500	SF	5.00	$12,500
	DIV 16 - ELECTRICAL	2,500	SF	22.86	$57,150
	S/T - PREP BUILDING				$1,072,122
	SITE GENERAL CONDITIONS	2.5%	S/T	14,203,818	$355,000
	ESCALATION		Allow		None Incl
	TOTAL DIRECT CONSTRUCTION (TDC)				$14,558,818

ROM ESTIMATE
Project: CURI - Wind Turbine Test Facility
Location: Charleston, South Carolina
Owner: CURI

Greenville, SC Office
Data Date: 17-Aug-09
Print Date: 20-Aug-09
Total SF: 54,340
Estimator: D.Hurt
Rev : 1

CSI DIV	Item Description	Qty	u/m	INSTALLED COST Unit/$	Total
	ESTIMATE DETAILS				
	SITE WORK / SITE PIPE RACKS / SITE ELECTRICAL				
02	**SITE PREPARATION**				**$110,000**
02	CLEAR & GRUB		AC		None Required
02	SITE DEMOLITION	1	AL	75,000.00	$75,000
02	EROSION CONTROL		AL		None Required
02	CUT TO FILL		CY		None Required
02	SITE RETAINING WALL		Allow		None Required
02	SITEGRADE & PROOFROLL		SF		None Required
02	FINE GRADE & LINES & BATTER		SF		None Required
02	SOIL POISONING		SF		None Required
02	SOIL BORINGS/INVESTIGATION	1	AL	35000.00	$35,000
02	**SITE IMPROVEMENTS**				**$25,000**
02	HEAVY DUTY ACCESS ROADWAY ASPHALT	1,389	SY	100.00	Replaced by Rail Spur
02	CONCRETE TIE-BEAMS - ASSUME 3' x 3' - FOR ROADWAY	542	CY	1000.00	Replaced by Rail Spur
02	GRAVEL SUBBASE - FOR ROADWAY	741	TN	35.00	Replaced by Rail Spur
02	CONCRETE PILES - ASSUME DRIVEN PILES 65' DEEP - FOR ROADWAY	250	EA	2000.00	Replaced by Rail Spur
02	RAIL SPUR		LF		Funded Separately
02	RAIL TRANSFER SWITCH		EA		Funded Separately
02	RAIL STOPS		EA		Funded Separately
02	DRESS UP SITE AREA	1	AL	25000.00	$25,000
02	**SITE UTILITIES - UNDER GROUND PIPING**				**$155,000**
02	STORM DRAINAGE - PIPING w/STRUCTURES	200	LF	150.00	$30,000
02	SANITARY SEWER	300	LF	200.00	$60,000
02	SANITARY SEWER - TIE - IN TO EXISTING LINE	1	AL	5000.00	$5,000
02	FIRE WATER PIPING	200	LF	200.00	$40,000
02	CITY WATER	100	LF	150.00	$15,000
02	METERING STATION	1	AL	2500.00	$2,500
02	BACKFLOW PREVENTER	1	AL	2500.00	$2,500
02	**SITE BUILDINGS/STRUCTURES**				**$0**
02	GUARD HOUSE		SF		None Required
02	PIPE RACK - CONCRETE & STEEL		LF		None Required
	PIPING/MECHANICAL SERVICES				**$240,000**
18	CS PIPELINES - TOWER WATER	200	LF	200.00	$40,000
18	CS PIPELINES - AIR PIPING	400	LF	125.00	$50,000
18	AIR COMPRESSOR - SMALL UNIT	1	EA	50000.00	$50,000
18	COOLING TOWER - SMALL UNIT - HYDRAULIC COOLING	1	EA	100000.00	$100,000
16	**SITE ELECTRICAL**				**$424,000**
16	Major Electrical Equipment - Step Down Transformer/Panels - Support Areas	1	EA	150000.00	$150,000
16	Major Electrical Equipment - Supporting Test Equipment		EA		By Equipment Vendor
16	Incoming Power Feeder	200	LF	1000.00	$200,000
16	Substation/Gear Foundation	15	CY	600.00	$9,000
16	SITE LIGHTING				
16	Site Lighting	6	EA	5000.00	$30,000
16	SITE COMMUNICATIONS/SECURITY	1	AL	35000.00	$35,000
16	EMERGENCY POWER SYSTEM				
16	STAND-BY EMERGENCY POWER		EA		By Equipment Vendor
16	UPS		EA		By Equipment Vendor
16	Other Misc Electrical Foundations		CY		None Required

ROM ESTIMATE
Project: CURI - Wind Turbine Test Facility
Location: Charleston, South Carolina
Owner: CURI

Greenville, SC Office
Data Date: 17-Aug-09
Print Date: 20-Aug-09
Total SF: 54,340
Estimator: D.Hurt
Rev : 1

CSI DIV	Item Description	Qty	u/m	INSTALLED COST Unit/$	Total
	BUILDING 69 TEST FACILITY				
	BUILDING SHELL	51,840	SF	7.50	$26,400
02	DEMOLITION - EXISTING WALL SECTION & FRAMING @ COLUMN LINES A & 2-3	3,520	SF	300.00	$244,444
02	DEMOLITION - SAW CUT & DEMO EXISTING FLOOR SLAB SECTION - 12" THICK FOR NEW FOUNDATI	815	CY	15000.00	$15,000
02	DEMOLITION - DEMO EXISTING DOCK @ A LINE	1	AL	30000.00	$30,000
02	DEMOLITION - DEMO FLOOR FOR U/G PLUMBING MODS	1	AL	2.00	$103,680
02	DEMOLITION - GENERAL AREA	51,840	SF	3200.00	$1,152,000
03	AUGERED MINI PILES - 350 EA - 8" x 70' DEEP	360	EA	20000.00	$20,000
03	MINI PILES - LOAD TEST	1	AL	35.00	$106,556
03	STRUCTURAL EXCAVATION	3,044	CY	75.00	$228,333
03	SPOIL WASTE - OFF SITE @ $30/tn	3,044	CY	50.00	$38,056
03	STRUCTURAL BACKFILL	761	CY	15000.00	$15,000
03	DEWATERING	1	AL	750.00	$426,667
03	FOUNDATIONS PILE CAPS - CRANE COLUMNS - ASSUME 3' X 3' X 4'	569	CY	700.00	$1,306,667
03	FOUNDATIONS - EQUIPMENT FOUNDATIONS - TEST PADS - ASSUME 6' THICK	1,667	CY	700.00	$322,145
03	FOUNDATIONS - EQUIPMENT FOUNDATIONS - PREP PADS - ASSUME 2' THICK	460	CY	650.00	$327,407
03	FOUNDATIONS - REPOUR SLAB ON GRADE	504	CY	650.00	$19,861
03	ELEVATED SLAB	31	CY	4000.00	$1,200,000
05	STRUCTURAL STEEL FRAMING @ CRANE COLUMNS	300	TN	8000.00	$80,000
05	STRUCTURAL STEEL FRAMING REINFORCE EXISTING BUILDING STEEL	10	TN	3000.00	$15,000
05	STRUCTURAL STEEL FRAMING OFFICE MEZZANINE	5	TN	5.00	$10,000
05	METAL FLOOR DECKING	2,000	SF	500.00	$30,000
05	ACCESS STAIRS	60	RI	25.00	$240,000
06-10	SEPARATION WALL - 40' HIGH	9,600	SF	50.00	$176,000
06-10	EXTERIOR DOORS - REFRAME & PROVIDE ACCESS	3,520	SF		$0
14	LIFT		STP	2.00	Existing
16	GROUNDING/LIGHTNING PROTECTION		SF		
	INTERIOR BUILD-OUT				
	CONDITIONED AREA	7,000	SF	50.00	$350,000
06-10	ARCHITECTURAL TREATMENTS	7,000	SF	50.00	$350,000
15	H.V.A.C. SYSTEMS - STAND ALONE UNITS	7,000	SF	25.00	$175,000
15	PLUMBING/DRAINAGE SYSTEMS	7,000	SF	5.00	$35,000
15	FIRE PROTECTION	7,000	SF	13.00	$91,000
16	BUILDING ELECTRICAL - BUILDING LIGHTING & 120V	7,000	SF	4.50	$31,500
16	BUILDING ELECTRICAL - AUX SYSTEMS				
	VENTILATED AREA	44,840	SF	5.00	$224,200
06-10	ARCHITECTURAL TREATMENTS - MINOR MODS ONLY	44,840	SF	10.00	$448,400
15	EXISTING UPGRADE VENTILATED AREA ONLY	44,840	SF	5.00	$224,200
15	PLUMBING/DRAINAGE - EXISTING MINOR MODS ONLY	6	EA	3500.00	$21,000
15	SAFETY SHOWERS & EYEWASH - INCL HOOKUP PIPING	44,840	SF	5.00	$224,200
15	FIRE PROTECTION	44,840	SF	5.00	$224,200
16	BUILDING ELECTRICAL - BUILDING LIGHTING & 120V - EXISTING MINOR MODS ONLY	44,840	SF	4.50	$201,780
16	BUILDING ELECTRICAL - AUX SYSTEMS				

ROM ESTIMATE
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Greenville, SC Office
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Estimator: D.Hurt
Rev : 1

CSI DIV	Item Description	Qty	u/m	INSTALLED COST Unit/$	Total
	CAPITAL EQUIPMENT & INSTALLATION	4	PCS	700000.00	$2,800,000
23	MATERIAL HANDLING EQUIPMENT	4	EA	700000.00	$2,800,000
23	150 TN OVERHEAD BRIDGE CRANES - 35 ft SPAN			$2,800,000	None Included
23	AUX EQUIPMENT		EQ$	2800000	$0
05	SUPPORT STEEL/PLATFORMS	10%	EQ$	2800000	$280,000
18	PROCESS EQUIPMENT INSTALLATION		EQ$	2800000	$0
18	PROCESS PIPING		EQ$	2800000	$0
17	INSTRUMENTATION		EQ$	2800000	$280,000
16	PROCESS ELECTRICAL	10%	EQ$	2800000	$0
19	INSULATION/COATINGS		EQ$	2800000	
	FREIGHT	3.0%	EQ$	2800000.0	$84,000
			IO		By Equipment Vendor
17	AUTOMATION SYSTEM				

ROM ESTIMATE
Project: CURI - Wind Turbine Test Facility
Location: Charleston, South Carolina
Owner: CURI

Greenville, SC Office
Data Date: 17-Aug-09
Print Date: 20-Aug-09
Total SF: 54,340
Estimator: D.Hurt
Rev : 1

CSI DIV	Item Description	Qty	u/m	INSTALLED COST Unit/$	Total
	PREP BUILDING				
	BUILDING SHELL				
02	DEMOLITION - GENERAL AREA	2,500	SF		$15,000
03	DRIVEN CONCRETE PILES - 50 EA - 65' DEEP	1	AL	15000.00	$125,000
03	MINI PILES - LOAD TEST	50	EA	2500.00	$5,000
03	STRUCTURAL EXCAVATION	1	AL	5000.00	$4,630
03	SPOIL WASTE - OFF SITE @ $30/tn	185	CY	25.00	$14,222
03	STRUCTURAL BACKFILL	190	CY	75.00	$1,465
03	DEWATERING	42	CY	35.00	$5,000
03	FOUNDATIONS PILE CAPS - CRANE COLUMNS - ASSUME 8' X 8' X 4'	1	AL	5000.00	$53,096
03	FOUNDATIONS - BUILDING FOUNDATION	76	CY	700.00	$53,096
03	FOUNDATIONS - EQUIPMENT FOUNDATIONS - PREP PADS - ASSUME 2' THICK	76	CY	700.00	$11,667
03	SLAB ON GRADE	17	CY	700.00	$46,296
03	ELEVATED SLAB	93	CY	500.00	$0
05	STRUCTURAL STEEL FRAMING @ CRANE COLUMNS		CY	650.00	$120,000
05	STRUCTURAL STEEL FRAMING - BUILDING FRAMING	30	TN	4000.00	$100,000
05	ACCESS STAIRS	25	TN	4000.00	$10,000
06-10	METAL ROOFING & SIDING	20	RI	500.00	$210,000
06-10	EXTERIOR DOOR - LARGE FOR CRANE ACCESS	10,500	SF	20.00	$50,000
14	LIFT	1,000	SF	50.00	$0
16	GROUNDING/LIGHTNING PROTECTION		STP		$5,000
		2,500	SF	2.00	
	INTERIOR BUILD-OUT				
	CONDITIONED AREA	300	SF	50.00	$15,000
06-10	ARCHITECTURAL TREATMENTS	300	SF	50.00	$15,000
15	H.V.A.C. SYSTEMS - STAND ALONE UNITS	300	SF	25.00	$7,500
15	PLUMBING/DRAINAGE SYSTEMS	300	SF	5.00	$1,500
15	FIRE PROTECTION	300	SF	13.00	$3,900
16	BUILDING ELECTRICAL - BUILDING LIGHTING & 120V	300	SF	4.50	$1,350
16	BUILDING ELECTRICAL - AUX SYSTEMS				
	VENTILATED AREA	2,200	SF	25.00	$55,000
06-10	ARCHITECTURAL TREATMENTS	2,200	SF	25.00	$55,000
15	HEAT & VENTILATION	2,200	SF	10.00	$22,000
15	PLUMBING/DRAINAGE	1	EA	3500.00	$3,500
15	SAFETY SHOWERS & EYEWASH - INCL HOOKUP PIPING	2,200	SF	5.00	$11,000
15	FIRE PROTECTION	2,200	SF	10.00	$22,000
16	BUILDING ELECTRICAL - BUILDING LIGHTING & 120V	100	LF	200.00	$20,000
16	BUILDING ELECTRICAL - BRIDGE CRANE EXTENSION	2,200	SF	4.50	$9,900
16	BUILDING ELECTRICAL - AUX SYSTEMS				

APPENDIX E

FACILITY ELECTRICAL INFRASTRUCTURE ESTIMATE AND DRAWING

Labor and Material Breakdown

of the

Estimate for the Clemson University

Wind Turbine Drivetrain Test Facility

EcoEnergy Construction

Clemson University

Wind Turbine Drivetrain Testing Facility

Material	Quantity	M Price	U	Material ($)	Labor	U	Labor (Hrs)	Labor Rate	Labor ($)	Total Cost ($)
CONDUIT										
2" GRC (GALV)	600	$ 262.06	C	$ 1,572.36	10.80	C	64.80	$ 73.35	$ 4,753.08	$ 6,325.44
4" GRC (GALV)	17,410	$ 806.11	C	$ 140,343.75	23.40	C	4,073.94	$ 73.35	$ 298,823.50	$ 439,167.25
2" GRC COUPLING	12	$ 317.99	C	$ 38.16	0.00	C	0.00	$ 73.35	$ -	$ 38.16
4" GRC COUPLING	306	$ 1,373.19	C	$ 4,201.96	0.00	C	0.00	$ 73.35	$ -	$ 4,201.96
2" GRC 90 ELBOW	12	$ 1,278.54	C	$ 153.42	60.00	C	7.20	$ 73.35	$ 528.12	$ 681.54
4" GRC 90 ELBOW	306	$ 5,923.19	C	$ 18,124.96	186.00	C	569.16	$ 73.35	$ 41,747.89	$ 59,872.85
2" STEEL LOCKNUT	16	$ 51.11	C	$ 8.18	6.00	C	0.96	$ 73.35	$ 70.42	$ 78.60
4" STEEL LOCKNUT	408	$ 359.35	C	$ 1,466.15	15.00	C	61.20	$ 73.35	$ 4,489.02	$ 5,955.17
2" PLASTIC BUSHING	8	$ 75.22	C	$ 6.02	5.00	C	0.40	$ 73.35	$ 29.34	$ 35.36
4" PLASTIC BUSHING	204	$ 268.38	C	$ 547.50	9.00	C	18.36	$ 73.35	$ 1,346.71	$ 1,894.21
2" GRC CUT&THREAD	16	$ -	C	$ -	54.00	C	8.64	$ 73.35	$ 633.74	$ 633.74
4" GRC CUT&THREAD	408	$ -	C	$ -	110.00	C	448.80	$ 73.35	$ 32,919.48	$ 32,919.48
30x30x10" SCREW CVR BOX NEMA1	9	$ 276.22	E	$ 2,485.98	2.50	E	22.50	$ 73.35	$ 1,650.38	$ 4,136.36
24" LADDER TRAY	540	$ 16.43	E	$ 8,872.20	14.50	C	78.30	$ 73.35	$ 5,743.31	$ 14,615.51
24" LADDER HORZ TEE SECT	10	$ 68.00	E	$ 680.00	2.50	E	25.00	$ 73.35	$ 1,833.75	$ 2,513.75
24" LADDER VERT 90 OUTSIDE	2	$ 68.00	E	$ 136.00	2.00	E	4.00	$ 73.35	$ 293.40	$ 429.40
36" LADDER TRAY	460	$ 27.29	E	$ 12,553.40	18.00	C	82.80	$ 73.35	$ 6,073.38	$ 18,626.78
36" LADDER HORZ TEE SECT	10	$ 83.00	E	$ 830.00	3.00	E	30.00	$ 73.35	$ 2,200.50	$ 3,030.50
1/4-20x1" BOLT (PLATED)	76	$ 4.19	C	$ 3.18	2.00	C	1.52	$ 73.35	$ 111.49	$ 114.67
3/8-16x1-1/2" BOLT (PLATED)	1,741	$ 11.87	C	$ 206.66	3.00	C	52.23	$ 73.35	$ 3,831.07	$ 4,037.73
1/4" FLAT WASHER (PLT)	76	$ 5.00	C	$ 3.80	1.00	C	0.76	$ 73.35	$ 55.75	$ 59.55
3/8" FLAT WASHER (PLT)	1,741	$ 5.00	C	$ 87.05	1.00	C	17.41	$ 73.35	$ 1,277.02	$ 1,364.07
										$ 600,732.06
WIRE										
#3/0 THHN	2,880	$ 2,060.43	M	$ 5,934.04	18.90	M	54.43	$ 73.35	$ 3,992.44	$ 9,926.48
#16/4 SJ CORD	540	$ 778.30	M	$ 420.28	28.00	M	15.12	$ 73.35	$ 1,109.05	$ 1,529.33
#14/4 SJ CORD	5,400	$ 1,228.32	M	$ 6,632.93	35.00	M	189.00	$ 73.35	$ 13,863.15	$ 20,496.08
#12/4 SJ CORD	5,400	$ 1,206.93	M	$ 6,517.42	42.00	M	226.80	$ 73.35	$ 16,635.78	$ 23,153.20
#350/1C 5KV CU SHLD 133%	70,896	$ 2,786.15	M	$ 197,526.89	45.00	M	3,190.32	$ 73.35	$ 234,009.97	$ 431,536.86
#500/1C 5KV CU SHLD 133%	2,016	$ 3,491.70	M	$ 7,039.27	56.40	M	113.70	$ 73.35	$ 8,339.90	$ 15,379.17
#350kCMil 35kV MV-105 Power Cable	10,656	$ 3,743.62	M	$ 39,892.01	55.00	M	586.08	$ 73.35	$ 42,988.97	$ 82,880.98
										$ 584,902.10
TERMINATIONS										
350 5KV HV TERMINATION	620	$ 35.00	E	$ 21,700.00	2.70	E	1,674.00	$ 73.35	$ 122,787.90	$ 144,487.90
500 5KV HV TERMINATION	56	$ 35.00	E	$ 1,960.00	2.95	E	165.20	$ 73.35	$ 12,117.42	$ 14,077.42
350 35KV HV TERMINATION	96	$ 70.00	E	$ 6,720.00	2.95	E	283.20	$ 73.35	$ 20,772.72	$ 27,492.72
350MCM 3-WAY SPLICE	56	$ 70.00	E	$ 3,920.00	8.65	E	484.40	$ 73.35	$ 35,530.74	$ 39,450.74
										$ 225,508.78
EQUIPMENT										
5kVDC Switchboard (3000A Bus, 4-Section) FBO	1	$ -	E	$ -	64.00	E	64.00	$ 73.35	$ 4,694.40	$ 4,694.40
5kVDC Switchboard (2500A Bus, 3-Section) FBO	1	$ -	E	$ -	48.00	E	48.00	$ 73.35	$ 3,520.80	$ 3,520.80
5kVAC Grid Simulation Package #1 (3000A Bus, 4-Section)	1	$ 200,000.00	E	$ 200,000.00	64.00	E	64.00	$ 73.35	$ 4,694.40	$ 204,694.40
[illegible] Package #2 (2500A Bus, 4-Section)	1	$ 200,000.00	E	$ 200,000.00	64.00	E	64.00	$ 73.35	$ 4,694.40	$ 204,694.40

EcoEnergy Construction

Clemson University

Wind Turbine Drivetrain Testing Facility

Material	Quantity		M Price	U	Material ($)	Labor	U	Labor (Hrs)		Labor Rate	Labor ($)		Total Cost ($)
7.5MVA DC Drive Unit #1 (FBO)	1	$	-	E	$ -	24.00	E	24.00	$	73.35	$ 1,760.40	$	1,760.40
7.5MVA DC Drive Unit #2 (FBO)	1	$	-	E	$ -	24.00	E	24.00	$	73.35	$ 1,760.40	$	1,760.40
15.0MVA Power Converter w/Opt. Grid Dist. Sim. (FBO)	1	$	-	E	$ -	72.00	E	72.00	$	73.35	$ 5,281.20	$	5,281.20
7.5MVA Power Converter w/Opt. Grid Dist. Sim. (FBO)	1	$	-	E	$ -	48.00	E	48.00	$	73.35	$ 3,520.80	$	3,520.80
15MVA AC/DC Rectifier (FBO)	1	$	-	E	$ -	24.00	E	24.00	$	73.35	$ 1,760.40	$	1,760.40
7.5MVA AC/DC Rectifier (FBO)	1	$	-	E	$ -	16.00	E	16.00	$	73.35	$ 1,173.60	$	1,173.60
												$	432,860.80
MISCELLANEOUS													
Engineering	1	$	276,000.00	E	$ 276,000.00	0.00	E	0.00	$	73.35	$ -	$	276,000.00
General Conditions	1	$	282,321.27	E	$ 282,321.27	0.00	E	0.00	$	73.35	$ -	$	282,321.27
Subcontracted Services	1	$	95,000.00	E	$ 95,000.00	0.00	E	0.00	$	73.35	$ -	$	95,000.00
Testing/Commissioning	1	$	85,000.00	E	$ 85,000.00	0.00	E	0.00	$	73.35	$ -	$	85,000.00
Bonding/Insurance	1	$	52,400.00	E	$ 52,400.00	0.00	E	0.00	$	73.35	$ -	$	52,400.00
												$	790,721.27

Total Cost:	$ 2,634,725.01
+8% Mark-up:	$ 210,778.00
Subtotal:	$ 2,845,503.01
+5% Fee:	$ 142,275.15
	$ 2,987,778.16

Note 1: Power converter recycles the power output from the unit under test, back to the DC bus. It also provides AC to the grid simulation bus and modulates the inverter to simulate grid disturbances.

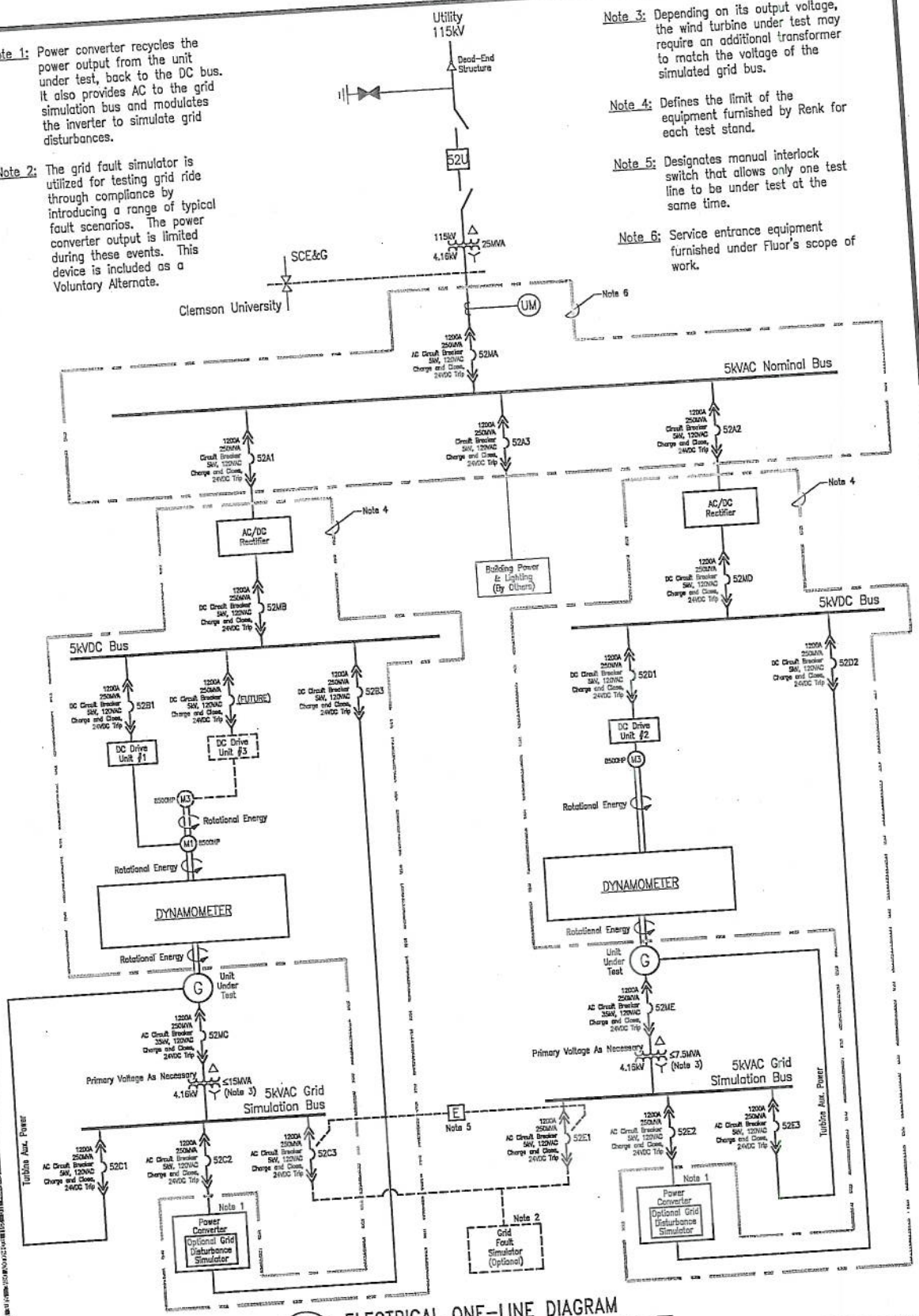
Note 2: The grid fault simulator is utilized for testing grid ride through compliance by introducing a range of typical fault scenarios. The power converter output is limited during these events. This device is included as a Voluntary Alternate.

Note 3: Depending on its output voltage, the wind turbine under test may require an additional transformer to match the voltage of the simulated grid bus.

Note 4: Defines the limit of the equipment furnished by Renk for each test stand.

Note 5: Designates manual interlock switch that allows only one test line to be under test at the same time.

Note 6: Service entrance equipment furnished under Fluor's scope of work.



E 1.1 ELECTRICAL ONE-LINE DIAGRAM

Scale: None

REV.	REVISION CHANGE(S)	DATE

CAD File (.dwg): One-Line.dwg

Sheet: E1

Status: Concep

Job No:

Scale: As Not

Date: 05-Aug-2

Created By:

Designed By:

2511 Technology Drive, Suite 110
Elgin, IL 60124 (815) 266-4201

EcoEnergy ENGINEERING

Wind Turbine Drivetrain Testing Facility for:

Clemson University

Charleston, South Carolina

CONVERTEAM
THE POWER CONVERSION COMPANY

Our Reference A901141
Customer: RENK
Project: Testcenter DOE

Thomas Hoffmann
21th August 2009

Technical Specification

for

RENK

DOE Test Center

Option
FRT and Grid simulation

Index:

1 FRT / Grid Simulation Equipment (Option)

1.1 Simulation as an option

The system offered, **includes certain features for the simulation of grid conditions**, however, a more detailed specification has to be discussed with the customer in order to design the main components.

1.2 Utility Company Demands on Wind Turbine Performance

The quality of power generated by wind turbines has gained increased importance. Demands of utility companies on wind turbine performance in case of grid disturbances are becoming more and more rigorous. Grid codes, e.g. by EON, have emerged over the years in order to control and limit detrimental effects of large scale integration of wind energy. The compliance of wind turbines when connected to a power network regulated by such grid codes has to be verified. Consequently wind energy manufacturers have to go through a lengthy certification procedure.

Especially the so called fault ride through (FRT) of wind turbines at various grid failures without major interruption of their power delivery is a challenge most difficult to meet.

Furthermore it is desirable for wind turbine manufacturers to have a 3-phase variable voltage, variable frequency power supply to test their turbines on their production site upon delivery to prove that the turbines can operate at different frequencies and voltages.

In recent years many renowned wind turbine suppliers have purchased test benches with a grid simulation system to ensure their wind turbines meet the above mentioned certification requirements in a reasonable amount of time as well as to develop new and more reliable wind turbine generations.

The main demands on an effective grid simulation system are described below:

1.3 Static Simulations (Grid Variation)

1.3.1 Grid variation includes:

- Simulation of grid frequency variation (45Hz~65Hz)
- Grid voltage variation
- Simulation of asymmetric line voltages (amplitude and angle of each phase)

Test aim: Operation of wind turbines at supply grids with rated frequency of 50 Hz or 60 Hz

- Determine limits for over and under voltage behavior of wind turbines
- Behavior of wind turbines at unstable grids

1.4 Dynamic Simulations (Grid Failures, Voltage Faults, Short Circuit Simulation)

Grid faults (symmetric or asymmetric) may be caused by short circuits and result into voltage dips of different levels, different recovery curves. Grid failure simulation includes:

- Short circuit simulation (1, 2 and 3-phase short circuits)
- Max. voltage dip: 16% of rated voltage for 625ms
- Max. allowed duration of voltage dip: 3s (recovery to 90% of nominal voltage
- Min. repeat rate: 20 min
- Max. allowed voltage dip at PCC (10kV): 3% (tbc by the local utility company)
- Incl. SW license
- Option: Fast data logging equipment

Test aim

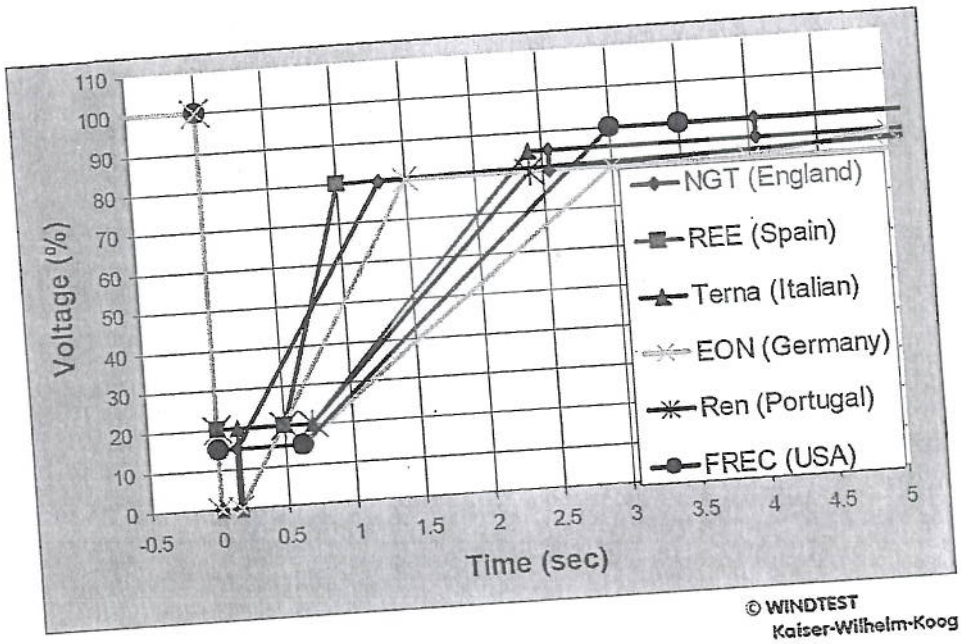
- FRT of wind turbines - Low voltage ride through (LVRT)
  - Option: High voltage ride through (HVRT)
- Short circuit behavior of wind turbines

1.5 Converteam's Flexible FRT Solution

Unstable grids and grid failures can be simulated by means of dynamic frequency / dynamic voltage control.

Converteam is using its high performing MV7000 inverter as grid simulator between the grid supply and the wind turbine generator. This way the proper reaction of the wind turbine at unstable grids or during failures can be tested. Any frequency of the power system between 45 … 65 Hz is possible. The inverter keeps the voltage at the PCC within the limits given by the local utility company.

Furthermore Converteam's advanced inverter technology allows the generation of various kinds of voltage dips (different levels, different recovery curves). The maximum total recovery time is up to 3 sec, which covers limits given by various international grid codes.



Grid Fault Limits according to international Grid Codes

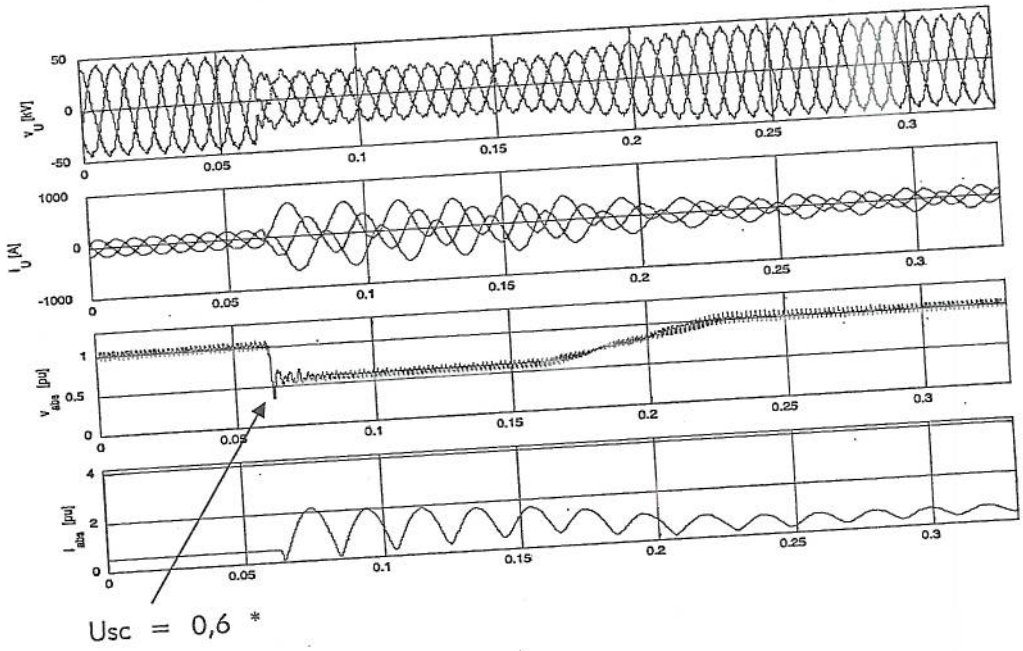
1.6 FRT Simulation with installed Inverter Power of 15 MVA

The diagram below shows a 3-phase short circuit simulation causing a voltage dip of approx. 60% of nominal line voltage. All 2-phase short circuits can only be done restricted.

To calculate the necessary inverter power the following data have to be provided by the customer:

- Grid data
- Data sheet and equivalent circuit diagram of the wind turbine generator
- Selected data of the wind turbines inverter

For the tendering phase Converteam assumes that a voltage dip down to approx. 60% of nominal line voltage can be achieved with 15MVA installed power (equals two (2) MV7306 inverter modules – see Single Line Diagram). Detailed clarification on the specific technical requirements for the grid fault simulation system should be achieved during the project clarification phase. A recalculation of assumed data might be necessary.



Voltage dip to 60% U_N

1.7 FRT Simulation with installed Inverter Power of 30MVA

The diagram below shows a 3-phase short circuit simulation causing a voltage dip of approx. 16% of nominal line voltage. All 2-phase short circuits can only be done restricted.

To calculate the necessary inverter power the following data have to be provided by the customer:

- Grid data
- Data sheet and equivalent circuit diagram of the wind turbine generator
- Selected data of the wind turbines inverter

For the tendering phase Converteam assumes that a voltage dip down to approx. 16% of nominal line voltage can be achieved with 30MVA installed power (equals four (4) MV7306 inverter modules – see Single Line Diagram). Detailed clarification on the specific technical requirements for the grid fault simulation system should be achieved during the project clarification phase. A recalculation of assumed data might be necessary.

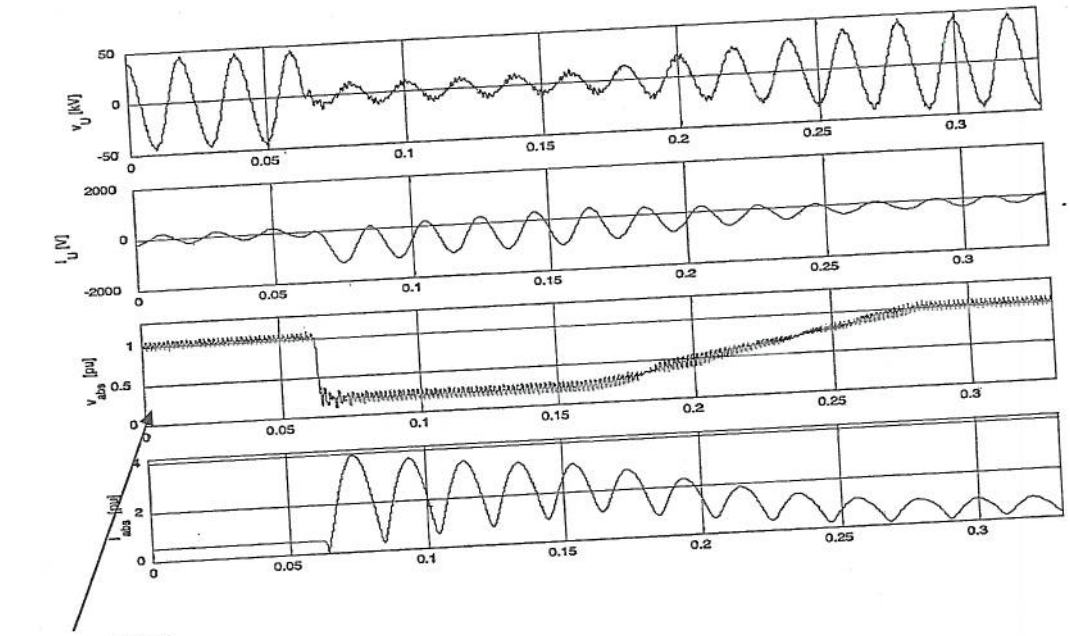


Figure 1: Voltage dip to 20% U_N

2 Single Line Diagram of the Test Bench

2.1 Basic Single Line